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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/537,100

06/02/2005

Tomohiro Akiyama

0054-0294PUS1

1254

2292 7590 05/13/2009  
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EXAMINER

LI, SHI K

ART UNIT

PAPER NUMBER

2613

NOTIFICATION DATE

DELIVERY MODE

05/13/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/537,100	<b>Applicant(s)</b> AKIYAMA ET AL.	
	<b>Examiner</b> Shi K. Li	<b>Art Unit</b> 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 3-6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 7-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 7 and 9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 7 recites that limitations “a first mirror” and “a second mirror”. Instant specification does not describe the limitations in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 9 recites that limitations “a first mirror” and “a second mirror”. Instant specification does not describe the limitations in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. (Japan Patent Application Pub. JP406276017) in view of Riza (U.S. Patent 5,187,487).

Regarding claim 1, Kobayashi et al. discloses in FIG. 3 an antenna feeding circuit. FIG. 3 comprises first optical demultiplexer 44<sub>11</sub>, second optical demultiplexer 44<sub>13</sub>, first optical frequency converter (frequency shifter) 49<sub>1</sub>, second optical frequency converter 49<sub>3</sub>, optical multiplexer 13, the output of which travel a single coaxial optical path, optical synthesizer 31, beam synthesizer 44 and a plurality of optoelectronic converters 53. The difference between Kobayashi et al. and the claimed invention is that Kobayashi et al. does not teach a spatial optical modulator. Riza teaches in FIG. 2 an apparatus for driving an antenna array. Riza teaches in FIG. 2 device 144 for controlling the beam width and spatial light modulator (SLM) 170 for adjusting the phase of the beams before the beams are superimposed with a reference beam. Kobayashi et al. also teaches a similar approach by adjusting the reference beams which has equivalent effect of adjusting the frequency shifted beams. One of ordinary skill in the art would have been motivated to combine the teaching of Riza with the antenna feeding circuit of Kobayashi et al. because the pixel array of the SLM corresponds to the antenna array so that a separate selectively phase delayed signal light beam is generated for each antenna element in the antenna array to be individually controlled. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a SLM for adjusting the phase of light beams, as taught by Riza, in the antenna feeding circuit of Kobayashi et al. because the pixel array of the SLM corresponds to the antenna array so that a separate selectively phase

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delayed signal light beam is generated for each antenna element in the antenna array to be individually controlled.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. and Riza as applied to claim 1 above, and further in view of Izadpanah et al. (U.S. Patent 7,020,396 B2) and Hong et al. (U.S. Patent 4,965,603).

Kobayashi et al. and Riza have been discussed above in regard to claim 1. Furthermore, Kobayashi et al. teaches in FIG. 3 Fourier transform lens 46 and optical transmission lines 48. It is well known in the art that fiber is a popular transmission line for optical signal. The difference between Kobayashi et al. and Riza and the claimed invention is that Kobayashi et al. and Riza teach phase modulation instead of intensity modulation. Izadpanah et al. teaches in FIG. 2 an optic-electronic ultra-wideband radio waveform generator. Izadpanah et al. teaches in FIG. 2 SLM 204 for modulating at least one of phase and amplitude. That is, Izadpanah et al. considers phase modulation and amplitude modulation provides equivalent function. Each of them may have minor difference from the other and more desirable for particular applications. Hong et al. provides another example of using amplitude modulation. Where the claimed differences involve the substitution of interchangeable or replaceable equivalents and the reason for the selection of one equivalent for another was not to solve an existent problem, such substitution has been judicially determined to have been obvious. See *In re Ruff*, 118, USPQ 343 (CCPA 1958). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to replace phase modulation with intensity modulation.

Since Kobayashi et al. teaches Fourier transform lens 46 along the reference beams, the Examiner cites Hong et al. to teach that the Fourier transform lens can be placed along the

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modulated beam. Hong et al. teaches in FIG. 1 an antenna feeder comprising SLM 24 and Fourier transform lens 26. The references, considered as a whole, suggest that the SLM and Fourier transform lens can be placed along the reference beams or the modulated beams and provide equivalent effects. Choosing of one over the other is an engineering choice that is obvious to one of ordinary skill in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to place a Fourier transform lens along the modulated beams.

6. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. and Riza as applied to claim 1 above, and further in view of Takushima et al. (U.S. Patent 6,810,170 B2).

Kobayashi et al. and Riza have been discussed above in regard to claim 1. The difference between Kobayashi et al. and Riza and the claimed invention is that Kobayashi et al. and Riza do not teach the structure of the multiplexer. Takushima et al. teaches multiplexers. In particular, Takushima et al. teaches in FIG. 5 a multiplexer comprising a first diffraction grating 221 and second diffraction grating 211 and a single coaxial optical path 90. One of ordinary skill in the art would have been motivated to combine the teaching of Takushima et al. with the modified antenna feeding circuit of Kobayashi et al. and Riza because the each wavelength in the multiplexer has a different optical path length and chromatic dispersion in these light components can be adjusted. Furthermore, the optical fibers 90 to 94 having no collimator function can be used; hence the multiplexer can be inexpensive. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multiplexer of Takushima et al. in the modified antenna feeding circuit of Kobayashi et al. and

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Riza because the each wavelength in the multiplexer has a different optical path length and chromatic dispersion in these light components can be adjusted.

7. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al., Riza and Izadpanah et al. as applied to claim 2 above, and further in view of Takushima et al. (U.S. Patent 6,810,170 B2).

Kobayashi et al., Riza and Izadpanah et al. have been discussed above in regard to claim 2. The difference between Kobayashi et al., Riza and Izadpanah et al. and the claimed invention is that Kobayashi et al., Riza and Izadpanah et al. do not teach the structure of the multiplexer. Takushima et al. teaches multiplexers. In particular, Takushima et al. teaches in FIG. 5 a multiplexer comprising a first diffraction grating 221 and second diffraction grating 211 and a single coaxial optical path 90. One of ordinary skill in the art would have been motivated to combine the teaching of Takushima et al. with the modified antenna feeding circuit of Kobayashi et al., Riza and Izadpanah et al. because the each wavelength in the multiplexer has a different optical path length and chromatic dispersion in these light components can be adjusted. Furthermore, the optical fibers 90 to 94 having no collimator function can be used; hence the multiplexer can be inexpensive. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multiplexer of Takushima et al. in the modified antenna feeding circuit of Kobayashi et al., Riza and Izadpanah et al. because the each wavelength in the multiplexer has a different optical path length and chromatic dispersion in these light components can be adjusted.

### ***Response to Arguments***

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8. Applicant's arguments filed 17 March 2009 have been fully considered but they are not persuasive.

The Applicant argues “The Examiner relies on the optical multiplexer 13 of Kobayashi as disclosing the above-identified claim feature. It is respectfully submitted that the optical multiplexer 13 of Kobayashi does not convert a first and second signal light beams different in wavelength outputted from a spatial optical modulator into a multiplex signal light beam to travel a single coaxial optical path.”

“Contrary to the claimed invention, multiplexer 13 of Kobayashi multiplexes an optical signal generated with each modulator, and outputs to each radiating element correspondence of the array antenna. Then, a light/electric transducer changes the optical signal corresponding to each radiating element into an electrical signal, respectively, and extracts a high frequency signal corresponding to each antenna beam, and supplies to each radiating element. (See paragraph [0018].) Indeed, Kobayashi clearly discloses that multiplexing is carried out and it is led to two or more optical transmission lines. (See paragraphs [0031] and [0033]).”

The Examiner disagrees. The two or more optical transmission lines (optical fiber bundle) 48 mentioned in paragraph [0031] correspond to the fiber array 54 of FIG. 1 of instant application. Kobayashi clearly teaches in FIG. 3 that there is only one single waveguide from multiplexer 13 to lens 43<sub>8</sub>. Therefore, Kobayashi teaches the limitation.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (6:30 a.m. - 4:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 571 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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7 May 2009

/Shi K. Li/

Primary Examiner, Art Unit 2613